

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1-54. (Cancelled)

55. (Original) A corneal appliance, comprising:  
a lens body comprising a synthetic lens material and dimensioned to be placed over a deepithelialized cornea of an eye of a subject; and  
a preformed layer of epithelial cells obtained from the subject receiving the corneal appliance, the preformed layer being disposed over an anterior surface of the lens body.

56. (Original) The corneal appliance of claim 55, wherein the lens body is configured to correct a refractive error selected from the group consisting of myopia, hyperopia, astigmatism, and presbyopia.

57. (Original) The corneal appliance of claim 55, wherein the lens body is configured to correct a wavefront aberration of an eye of a patient.

58. (Original) The corneal appliance of claim 55, wherein the lens body includes at least one of a multifocal zone, a toric zone, and two or more zones joined without a junction.

59. (Original) The corneal appliance of claim 55, wherein the lens body comprises recombinant collagen.

60. (Original) The corneal appliance of claim 55, wherein the lens body comprises a synthetic polymeric material.

61. (Original) The corneal appliance of claim 55, wherein the lens body comprises a combination of a synthetic material and collagen.

62. (Original) The corneal appliance of claim 61, wherein the collagen is selected from a group consisting of bovine collagen, porcine collagen, avian collagen, murine collagen, and equine collagen.

63. (Original) The corneal appliance of claim 61, wherein the collagen is recombinant collagen.

64. (Original) The corneal appliance of claim 55, wherein the anterior surface of the lens body is treated to promote attachment of the preformed layer of epithelial cells.

65. (Original) The corneal appliance of claim 55, wherein the preformed layer of epithelial cells is a layer of epithelium removed from the patient's eye.

66. (Original) The corneal appliance of claim 55, further comprising stem cells disposed over the anterior surface of the lens body that promote attachment of the preformed layer of epithelial cells to the lens body.

67. (Original) The corneal appliance of claim 55, wherein the preformed layer of epithelial cells is a layer of epithelium that remains attached to the epithelium of the patient's eye when the lens body is being placed over the cornea.

68. (Original) The corneal appliance of claim 55, wherein the preformed layer of epithelial cells has a temperature less than the temperature of the epithelial cells that are on the eye before the preformed layer of epithelial cells is placed over the lens body.

69. (Original) The corneal appliance of claim 55, wherein the preformed layer of epithelial cells is more securely attached to the anterior surface of the lens body than a layer of epithelium attached to a lens body obtained from donor corneal tissue.

70. (Original) A method of manufacturing a corneal appliance, comprising:

- a) forming a synthetic material into a shape of a lens having a desired optical power; and
- b) applying epithelial cells over an anterior surface of the lens so that the epithelial cells will attach to the lens.

71. (Original) The method of claim 70, wherein the lens comprises collagen.

72. (Original) The method of claim 71, wherein the collagen is a recombinant collagen.

73. (Original) The method of claim 71, wherein the lens comprises a combination of a synthetic material and collagen.

74. (Original) The method of claim 70, further comprising a step of: modifying the surface of the lens before applying the epithelial cells to promote attachment of the epithelial cells to the lens.

75. (Original) The method of claim 70, further comprising a step of: adding stromal keratocytes to the lens.

76. (Original) The method of claim 70, further comprising a step of: culturing stem cells on the first surface of the lens so that the stem cells differentiate into corneal epithelial cells.

77. (Original) The method of claim 70, wherein the epithelial cells are provided in a preformed layer obtained from a patient receiving the corneal appliance.

78. (Original) The method of claim 77, wherein the preformed layer of epithelial cells is formed by separating a portion of the patient's corneal epithelium from the Bowman's membrane of the eye to create a flap of epithelium that remains attached to the eye.

79. (Original) The method of claim 70, further comprising a step of applying an adhesive to facilitate securing the corneal appliance over an eye of the subject.

80. (Original) The method of claim 70, wherein the synthetic material is shaped to have a center thickness between about 10 micrometers to about 300 micrometers, and an edge thickness between about 0 micrometers to about 120 micrometers.

81. (Original) A method for vision correction, comprising: inserting a vision correcting ocular device beneath an epithelium of a cornea of an eye substantially without uncovering an anterior surface of the cornea located under the epithelium.

82. (Original) The method of claim 81, further comprising forming an incision in the epithelium, and inserting the ocular device through the incision.

83. (Original) The method of claim 82, wherein the step of forming an incision includes forming an incision on an approximate nasal portion, a temporal portion, a superior portion, and/or inferior portion of the epithelium.

84. (Original) The method of claim 82, wherein the step of forming an incision includes forming an incision on an approximate medial portion of the epithelium to form a first pocket and a second pocket, each pocket sized to accommodate a portion of the lens body.

85. (Original) The method of claim 81, further comprising deforming the ocular device prior to the inserting step.

86. (Original) The method of claim 81, further comprising removing the ocular device from the eye, and inserting another

vision correcting ocular device beneath the epithelium of the eye.

87. (Original) The method of claim 81, wherein the ocular device is a vision correcting lens.

88. (Original) The method of claim 81, wherein the ocular device is a contact lens structured to be placed between the epithelium and a Bowman's membrane of the cornea.

89. (Original) The method of claim 81, wherein the ocular device comprises a synthetic material.

90. (Original) The method of claim 81, wherein the ocular device comprises a synthetic polymeric material.

91. (Original) The method of claim 81, wherein the inserting step occurs without forming an epithelial flap.

92. (Original) The method of claim 81, further comprising forming a plurality of incisions in the epithelium.

93. (Original) The method of claim 81, wherein the inserting step occurs substantially without damaging the surface of the cornea beneath the epithelium.

94. (Original) The method of claim 93, wherein the inserting step occurs substantially without damaging a Bowman's membrane of the cornea.

95. (Original) The method of claim 93, wherein the inserting step occurs substantially without damaging a portion of a stroma of the cornea of the eye.

96. (Original) The method of claim 81, further comprising administering a healing agent to the eye in an amount effective to promote healing of the epithelium.

97. (Original) The method of claim 81, wherein the inserting step comprises lifting a portion of the epithelium from the cornea, forming an incision in the epithelium, and passing the ocular device through the incision.

98. (Original) The method of claim 97, wherein the epithelium is lifted using a vacuum.

99. (Original) The method of claim 97, wherein the epithelium is lifted by delivering a fluid beneath the epithelium.

100. (Original) The method of claim 81, further comprising applying an effective amount of an epithelium preserving agent to the epithelium.

101. (Original) The method of claim 100, wherein the epithelium preserving agent includes a gel.

102. (Original) The method of claim 100 wherein the epithelium preserving agent comprises a component selected from the group consisting of water soluble polymeric materials, water swellable polymeric materials and mixtures thereof.

103. (Original) The method of claim 100, wherein the epithelium preserving agent includes at least one cellulosic component.

104. (Original) The method of claim 103, wherein the epithelium preserving agent includes hydroxymethylcellulose.

105. (Original) The method of claim 82, wherein forming step comprises using a sharp blade to slice through the epithelium.

106. (Original) The method of claim 82, wherein the forming step comprises using a blunt instrument to separate the epithelium substantially without slicing the epithelium.

107. (Original) The method of claim 82, wherein the forming step comprises using a microkeratome.

108. (Original) The method of claim 106, wherein the blunt instrument is a spatula or a wire.

109-111. (Cancelled).

112. (Currently amended) The method of claim ~~109~~ 99, wherein the ~~liquid~~ fluid includes sodium chloride and/or other tonicity agent.

113. (Currently amended) The method of claim ~~109~~ 99, wherein the ~~liquid~~ fluid is a hypertonic aqueous liquid.



114-117. (Cancelled)

118. (Currently amended) The method of claim ~~107~~ 81, further comprising removing the ocular device from beneath the epithelium, and inserting another corrective ocular device beneath the epithelium.

119. (Cancelled)

120. (Cancelled)

121. (Currently amended) ~~A method of correcting vision,~~  
The method of claim 81, further comprising:

applying a liquid to the epithelium of a cornea of an eye, the liquid being effective in loosening the epithelium substantially without killing epithelial cells;

treating the epithelium to provide and/or maintain the epithelium in a moisturized state;

raising a portion of the loosened, moisturized epithelium from a surface of a cornea of an eye located below the epithelium;

separating the raised portion of the epithelium from the surface of the cornea;

forming one or more incisions in the raised portion of the epithelium to accommodate the ocular device, ~~and~~

~~inserting a corrective ocular device beneath the epithelium through the one or more incisions.~~

122. (Original) The method of claim 121, wherein the steps occur sequentially.

123. (Original) The method of claim 121, further comprising, prior to the forming step, delivering a substance beneath the raised portion of the epithelium to maintain a spaced apart relationship between the epithelium and the surface of the cornea.

124. (Original) The method of claim 121, wherein the liquid that is applied includes sodium chloride and/or other tonicity agent.

125. (Original) The method of claim 121 wherein the liquid that is applied is a hypertonic aqueous liquid.

126. (Original) The method of claim 121, further comprising scoring a portion of the epithelium to create an epithelial defect prior to applying the liquid.

127. (Original) The method of claim 121, wherein the treating step comprises applying a gel to the epithelium.

128. (Original) The method of claim 127, wherein the gel-containing composition comprises a component selected from the group consisting of water soluble polymeric materials, water swellable polymeric materials and mixtures thereof.

129. (Original) The method of claim 127, wherein the gel-containing composition comprises at least one cellulosic component.

130. (Original) The method of claim 129 wherein the gel-containing composition comprises hydroxymethylcellulose.

131. (Cancelled)

132. (Original) The method of claim 121, wherein the step of separating the epithelium from the surface of the cornea includes using a blunt dissection apparatus.

133. (Cancelled)

134. (Original) The method of claim 121, wherein the substance that is delivered to beneath the raised portion of the epithelium is a gel-containing composition.

135. (Original) The method of claim 134, wherein the gel-containing composition comprises a component selected from the group consisting of water soluble polymeric materials, water swellable polymeric materials and mixtures thereof.

136. (Original) The method of claim 134, wherein the gel-containing composition comprises a cellulosic component

137. (Original) The method of claim 134, wherein the gel-containing composition includes hydroxymethylcellulose.

138. (Cancelled)

139. (Original) The method of claim 121, wherein the forming step produces one or more epithelial flaps.

140. (Original) The method of claim 121, wherein the forming step comprises forming a plurality of incisions in the raised portion of the epithelium.

141. (Original) The method of claim 140 wherein the forming step produces two or more epithelial flaps.

142-149. (Cancelled)

150. (Currently amended) The method of claim ~~142~~ 81, further comprising administering a moisturizer to the epithelium effective in providing and/or maintaining the epithelium in a moisturized state.

151-159. (Cancelled)

160. (Currently amended) ~~A method of correcting vision,~~  
The method of claim 81, further comprising:

.. applying a liquid to the epithelium of a cornea of an eye, the liquid being effective in loosening the epithelium substantially without killing epithelial cells;

raising a portion of the loosened epithelium from a surface of a cornea of an eye located below the epithelium;

separating the raised portion of the epithelium from the surface of the cornea;

delivering a substance beneath the raised portion of the epithelium to maintain a spaced apart relationship between the epithelium and the surface of the cornea;

forming one or more elongated incisions in the raised portion of the epithelium to accommodate the ocular device, and ~~inserting a corrective ocular device beneath the epithelium through the one or more incisions.~~

161. (Original) The method of claim 160, wherein the liquid that is applied includes sodium chloride and/or other tonicity agent.

162. (Original) The method of claim 160, wherein the liquid that is applied is a hypertonic aqueous liquid.

163. (Original) The method of claim 160, further comprising scoring a portion of the epithelium to create an epithelial defect prior to applying the liquid.

164. (Original) The method of claim 160, wherein the step of raising a portion of the epithelium includes using a vacuum.

165. (Original) The method of claim 160, wherein the step of separating the epithelium from the surface of the cornea includes using a blunt dissection apparatus.

166. (Original) The method of claim 165, wherein the blunt dissection apparatus comprises a spatula or a wire.

167. (Original) The method of claim 160, wherein the substance that is delivered to beneath the raised portion of the epithelium is a gel-containing composition.

168. (Original) The method of claim 167, wherein the gel-containing composition comprises a component selected from the group consisting of water soluble polymeric materials, water swellable polymeric materials and mixtures thereof.

169. (Original) The method of claim 167, wherein the gel-containing composition comprises at least one cellulosic component.

170. (Original) The method of claim 169, wherein the gel-containing composition includes hydroxymethylcellulose.

171. (Original) The method of claim 160, wherein the one or more incisions are formed using a microkeratome.

172. (Original) The method of claim 160, wherein the forming step produces one or more epithelial flaps.

173. (Original) The method of claim 160, wherein the forming step comprises forming a plurality of incisions in the raised portion of the epithelium.

174. (Original) The method of claim 173 wherein the forming step produces two or more epithelial flaps.

175. (Original) The method of claim 160, wherein the ocular device is a vision correcting lens.

176. (Original) The method of claim 175, wherein the ocular device is a contact lens.

177. (Original)        The method of claim 160, further comprising applying a healing agent to the epithelium at the one or more incisions.